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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/707,132	11/06/2000	Greg Pellegrino	P00-3251	8788

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EXAMINER

CHU, GABRIEL L

ART UNIT	PAPER NUMBER
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2184

DATE MAILED: 12/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/707,132	PELLEGRINO ET AL.	
	Examiner	Art Unit	
	Gabriel L. Chu	2184	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-11, 14-17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4, 7-11, 14-17, 19 and 20 is/are allowed.
- 6) ☒ Claim(s) 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 21 is objected to because of the following informalities: Referring to claim 21, "of a first path to the first storage" is understood to refer to "of a first path to the first storage node". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6658478 to Singhal et al. Referring to claim 21, Singhal discloses a data communication apparatus for performing writes to a mirrored dataset having a first copy on a first storage node and a second copy on a second storage node (From line 66 of column 1, "Various efforts have been made to reduce the problems associated with disk storage systems. One exemplary system resulting from such efforts employs a "node" to control the access of data/information into a number of disk drives. In such previously developed system, the node stores redundant data (e.g., parity information or a duplicate copy of the data itself) to multiple disk drives so that if one disk drive fails, the redundant data can be used to reconstruct the data. The node includes a main computer system having system memory into which data can be cached to reduce the slow seek time of associated with disk drives. Furthermore, the node may store data

across multiple disk drives in a technique known as "striping" so that the effective data storage bandwidth is the aggregate bandwidth of the individual disk drives. In addition, multiple nodes may be used within a system to provide redundancy.”), comprising: means for checking a status, from the data communication apparatus, of a first path to the first storage node and of a second path to the second storage node (From line 50 of column 3, “Still another technical advantage of the present invention includes providing a number of serial connections in addition to the communication paths connecting the nodes of the system and architecture. A separate serial connection is provided for each two nodes. This serial connection is distinct and independent from the communication path which connects the same two nodes. The serial connection provides or supports a "heartbeat" connection between the two respective nodes, thus allowing each of the two nodes to query the other node in order to determine if the other node has failed. This avoids the potential corruption of data due to a "split-brain" problem between the two nodes.”); means for performing a write to the first copy of the mirrored dataset over the first path when the checking determines the first path has good status and second path has bad status (From line 28 of column 3, “Each communication path can be a bi-directional link having high bandwidth to provide rapid transfer of data and information between nodes.” Further, from line 44 of column 2, “According to an embodiment of the present invention, a data storage system includes a plurality of nodes for providing access to a data storage facility. Each node has a computer-memory complex to provide general purpose computing for the node, a node controller to control data transfers through the respective node, and a cluster memory to buffer data for the data

transfers. A plurality of communication paths interconnect the nodes, with a separate communication path provided for each two nodes of the data storage system." Further, from line 65 of column 2, "A data storage system in accordance with an embodiment of the present invention includes multiple nodes (e.g., up to eight in one implementation). These nodes provide connections for transferring data and information between and among a number of host devices (e.g., servers) and storage devices (e.g., disk drives). Each node is connected to every other node by a number of communication paths, each of which can be a high-speed link. Each node may include a node controller, a cluster memory, and a computer-memory complex. A technical advantage of the present invention includes providing, at each node, a node controller and cluster memory which are separate from the computer-memory complex." Further, from line 30 of column 14, "In an embodiment of the present invention, however, more than two nodes are provided. In the event, that one node fails, the load of that node can be more evenly distributed across the surviving nodes. Thus, for example, if Node 0 fails, then each of Node 1, Node 2, and Node 3 may take over control of some portion of the storage devices assigned to Node 0. In particular, Node 1 takes over control of Disk 0, Node 2 takes over control of Disk 1, and Node 3 takes over control of Disk 2. Because the work load of the failed node is evenly distributed among the other nodes, none of the remaining nodes will act as a bottleneck in the system."); means for polling a node capable of performing surrogate writes to determine whether the surrogate-capable node has a path having good status to the second storage node (From line 50 of column 3, "Still another technical advantage of the present invention includes providing

a number of serial connections in addition to the communication paths connecting the nodes of the system and architecture. A separate serial connection is provided for each two nodes. This serial connection is distinct and independent from the communication path which connects the same two nodes. The serial connection provides or supports a "heartbeat" connection between the two respective nodes, thus allowing each of the two nodes to query the other node in order to determine if the other node has failed. This avoids the potential corruption of data due to a "split-brain" problem between the two nodes."); and means for transmitting a write request to the second copy to the surrogate-capable node, wherein the write request is configured to cause the surrogate-capable node to forward the write request to the second storage node to write to the second copy (From line 13 of column 14 (with emphasis), "Each host device 12 and each storage device 20 may have a primary node and a secondary node. In normal operation, in one embodiment, the primary node performs all accesses to the respective host/storage device; the secondary node takes over only if the primary node fails. In an alternative embodiment, the primary node and the secondary node are simultaneously active to perform **accesses**. In the arrangement depicted in FIG. 8, the nodes 22 could be paired so that each of Node 0 and Node 1 takes over control of the other node's storage devices 20 in the event of failure of the other node. Likewise, Node 2 and Node 3 could be paired so that each of these nodes takes over control of the other node's storage devices in the event of failure. With such pairings, if a particular node fails, the load of its associated node would double, and thus would very likely be a bottleneck in data storage system 10. This doubling of load is unavoidable in a system with only two

nodes. In an embodiment of the present invention, however, more than two nodes are provided. In the event, that one node fails, the load of that node can be more evenly distributed across the surviving nodes. Thus, for example, if Node 0 fails, then each of Node 1, Node 2, and Node 3 may take over control of some portion of the storage devices assigned to Node 0. In particular, Node 1 takes over control of Disk 0, Node 2 takes over control of Disk 1, and Node 3 takes over control of Disk 2. Because the work load of the failed node is evenly distributed among the other nodes, none of the remaining nodes will act as a bottleneck in the system.”). Although Singhal et al. do not specifically disclose in the detailed embodiments that a multi-node mirroring system can be implemented in conjunction with their invention, it would have been obvious to Singhal et al. at the time of the invention to enable multi-node mirroring because, from line 20 of column 2, “the node can be a single point of failure for the system--i.e. if the node fails, all of the data on disk drives connected to the node is unavailable. Even if multiple nodes are provided, communication between nodes is typically slow, and thus performance of the system is less than optimal.” Further, from line 66 of column 1, “Various efforts have been made to reduce the problems associated with disk storage systems. One exemplary system resulting from such efforts employs a “node” to control the access of data/information into a number of disk drives. In such previously developed system, the node stores redundant data (e.g., parity information or a duplicate copy of the data itself) to multiple disk drives so that if one disk drive fails, the redundant data can be used to reconstruct the data. The node includes a main computer system having system memory into which data can be cached to reduce the

slow seek time of associated with disk drives. Furthermore, the node may store data across multiple disk drives in a technique known as "striping" so that the effective data storage bandwidth is the aggregate bandwidth of the individual disk drives. In addition, multiple nodes may be used within a system to provide redundancy."

Allowable Subject Matter

4. Claims 1-4, 7-11, 14-17, 19, and 20 are allowed.

Response to Arguments

5. Applicant's arguments with respect to claim 21 have been considered but are moot in view of the new ground(s) of rejection. Specifically, referring to Applicant's argument, from page 10 of paper no. 3, that "New claim 21 is written in means-plus language and present the limitations of claim 19 in an apparatus", Examiner observes that not all of the limitations present in claim 19 are present in claim 21.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6073209 to Bergsten

US 6128750 to Espy et al.

US 6397356 to Yonezawa

US 6421711 to Blumenau et al.

US 6643795 to Sicola et al.

US 6654769 to Ito et al.

US 6658478 to Singhal et al.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gabriel L. Chu whose telephone number is (703) 308-7298. The examiner can normally be reached on weekdays with alternate Fridays off.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W. Beausoliel, Jr. can be reached on (703) 305-9713. The fax phone number for the organization where this application or proceeding is assigned is (703) 746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

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Art Unit: 2184

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